
M-DG Seminar: Multinomial Processing Tree Modeling

Summer semester 2020

Prof. Dr. Daniel Heck

Content

What you should learn in this seminar:

- How can we **measure latent psychological processes**?
- What are the **statistical foundations** of MPT modeling?
- How to **develop and apply** MPT models?

Why is this useful?

- General understanding of **cognitive modeling**:
Connecting statistical methods & psychological theory
- MPT models are applied in **many areas**
 - memory, reasoning, social cognition, implicit attitudes, evaluative conditioning, decision making, aging, dishonesty, witness detection, environmental psychology, ...

Organisational Stuff

M-DG Seminar (1 ECTS): Self study

- **Reading** of mandatory literature
- **Self study** of PDFs and video slides
- **Participation** in web-conference
 - not mandatory, but probably helpful for the exercises

Course requirements (“Studienleistung”, 1 ECTS)

- **Exercises**: Hand in solutions as PDF via email
- Responses may be given in **bullet point style**
- No grades, just **pass/fail**

Online Teaching

Structure

- The seminar is split into two parts:
- (A) Theory → Self study
- (B) Application → Online meeting

Remarks

- Online teaching is new to almost all of us (including the lecturer)
- Hence, I am thankful for any feedback

M-DG: Multinomial Processing Tree Modeling

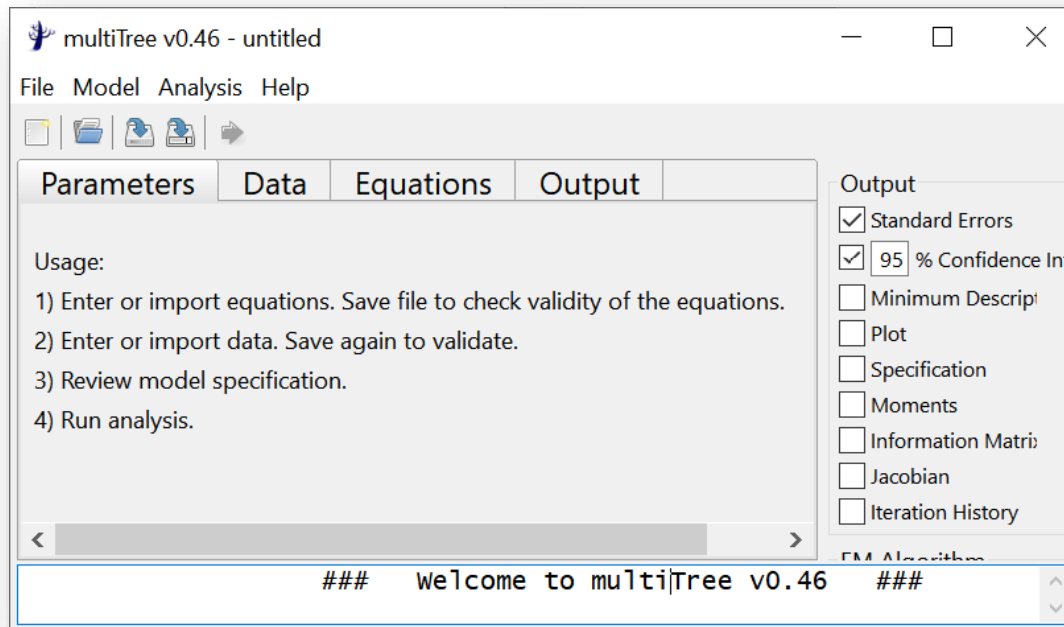
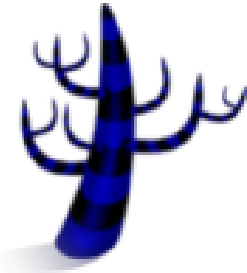
Part	Date	Topic	Literature
(A) Theory	Self study	A1) Introduction	Erdfelder et al. (2009)
		A2) Basics of MPT modeling	Batchelder & Riefer (1999)
		A3) The software multiTree	Moshagen (2010)
		A4) Hierarchical MPT modeling	Lee (2011) Heck et al. (2018)
(B) Application	15.5.*	B1) Questions & Practice with multiTree	Batchelder & Riefer (1986)
	20.5.*	B2) Workflow: Developing an MPT model	Jung et al. (2019)

* Web-Conference, 12:00 – 15:00, <https://webconf.hrz.uni-marburg.de/b/dan-fvk-ha6>

Software

Free software for MPT modeling:

- multiTree (Moshagen, 2010)
- Download: <https://www.sowi.uni-mannheim.de/erdfelder/forschung/software/multitree/>



Literature: Mandatory

- Erdfelder, E., Auer, T.-S., Hilbig, B. E., Assfalg, A., Moshagen, M., & Nadarevic, L. (2009). Multinomial processing tree models: A review of the literature. *Zeitschrift Für Psychologie / Journal of Psychology*, 217, 108–124. <https://doi.org/10.1027/0044-3409.217.3.108>
- Batchelder, W. H., & Riefer, D. M. (1999). Theoretical and empirical review of multinomial process tree modeling. *Psychonomic Bulletin & Review*, 6, 57–86. <https://doi.org/10.3758/BF03210812>

Literature: Further Reading

- Methods & Software:

- Heck, D. W., Arnold, N. R., & Arnold, D. (2018). TreeBUGS: An R package for hierarchical multinomial-processing-tree modeling. *Behavior Research Methods*, 50(1), 264–284.
<https://doi.org/10.3758/s13428-017-0869-7>
- Lee, M. D. (2011). How cognitive modeling can benefit from hierarchical Bayesian models. *Journal of Mathematical Psychology*, 55, 1–7.
<https://doi.org/10.1016/j.jmp.2010.08.013>
- Moshagen, M. (2010). multiTree: A computer program for the analysis of multinomial processing tree models. *Behavior Research Methods*, 42, 42–54.
<https://doi.org/10.3758/BRM.42.1.42>

Literature: Further Reading

- Specific MPT models:
 - Batchelder, W. H., & Riefer, D. M. (1986). The statistical analysis of a model **for storage and retrieval** processes in human memory. *British Journal of Mathematical and Statistical Psychology*, 39, 129–149. <https://doi.org/10.1111/j.2044-8317.1986.tb00852.x>
 - Batchelder, W. H., & Riefer, D. M. (1990). Multinomial processing models of **source monitoring**. *Psychological Review*, 97, 548–564. <https://doi.org/10.1037/0033-295X.97.4.548>
 - Jung, D., Erdfelder, E., Bröder, A., & Dorner, V. (2019). Differentiating motivational and cognitive explanations for **decision inertia**. *Journal of Economic Psychology*, 72, 30–44. <https://doi.org/10.1016/j.joep.2019.01.004>